**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

**REGION 4**
**SUPERFUND & EMERGENCY MANAGEMENT DIVISION**
**61 FORSYTH STREET**
**ATLANTA, GEORGIA 30303-8960**

July 28, 2021

**4SEMD-RSIB-SSS**

**MEMORANDUM**

**SUBJECT:** Review of Record of Decision for Comprehensive Environmental Response, Compensation, and Liability Act Oak Ridge Reservation Waste Disposal at the Environmental Management Disposal Facility, Oak Ridge, Tennessee

**FROM:** Sharon R. Thoms, Life Scientist
Scientific Support Section
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Date: 2021.07.28 08:41:59 -04'00'

**THRU:** Tim Frederick, Chief
Scientific Support Section
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Tim Frederick
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**TO:** Carl Froede, Remedial Project Manager
Restoration and DOE Coordination Section
Restoration and Site Evaluation Branch

Per your request on June 2, I have reviewed the Environmental Management Disposal Facility (EMDF) D1 Record of Decision (ROD). My review focused on monitoring requirements for the period when the landfill will actively receive hazardous waste materials. My comments are provided below. If you should have any questions, please feel free to contact me at 404-562-8666 or thoms.sharon@epa.gov.

**GENERAL ECOLOGICAL COMMENTS:**

1. The remedial action objectives (RAOs) on Page 1-5 are unclear because they do not specify the timeframe when the objectives will be met such as whether the objectives will be met throughout the construction, operation, and post-closure care of the landfill. Section 1.3 should reference tables of applicable or relevant and appropriate

requirements (ARARs) in Appendix A. Chemical specific ARARs should be tabulated in the ROD and referenced in Section 1.3.

2. Remedial action objectives (RAOs) (Page 1-5) should be revised to add language to restore water quality in Bear Creek to meet ARARs and restore beneficial uses for Bear Creek to support healthy populations and communities of benthic macroinvertebrates and fish relative to a suitable reference location pursuant to TDEC 0400-40-03.

3. Without a risk assessment, it is uncertain whether the proposed action will be protective of the environment. The D1 ROD is currently deficient because it lacks a baseline risk assessment. The sought-after baseline risk assessment will consider current conditions in Bear Creek and the future conditions predicted to occur under hypothetical failure of the manmade components of the landfill, given the waste acceptance criteria (WAC) for the selected remedy. The RAOs are currently restricted to compliance with ARARs. Until the time a risk assessment can be conducted, statements such as "be protective of human health and the environment" on Page 1-4 are recommended to be replaced by "complies with all RCRA requirements and ARARs."

4. Please discuss the baseline risks from current conditions in Bear Creek. Please discuss whether risk in question is additive risk on top of risks already present before construction of the facility. Describe the current ranges of contaminants in fish tissues and how the remedy will reduce the body burdens of contaminants in fish tissue to restore beneficial uses including support of healthy populations and communities of aquatic life.

5. TDEC has classified Bear Creek as having a fishable/swimmable goal. Bear Creek is CWA 303(d) listed for not currently achieving its designated uses on account of PCBs in fish and cadmium and mercury released from the S-3 Ponds. The creek lacks additional capacity to take on increased discharges of pollutants released from the landfill without increasing the degree of degradation of fish and macroinvertebrate communities by physical alteration and addition of pollutants. Releases from the landfill will likely further degrade downstream water bodies on the CWA 303(d) list. The ROD should discuss how CWA and TDEC 0400.40.03 were considered in the selection of the remedy.

6. The ROD should consider technologies to sequester mercury to prevent its penetration of the landfill liner in the case of remedy failure.

7. The ROD is deficient because it does not comply with EPA's background policy and guidance https://www.epa.gov/risk/role-background-cercla-cleanup-program. Background in CERCLA refers to constituents present either naturally occurring or anthropogenic not influenced by the site in question, i.e., contamination present before the landfill is constructed to receive wastes. EPAs background policy states that the presence of high background concentrations of hazardous substances,

pollutants, and contaminants found at a site is a factor that should be considered in risk assessment and risk management. EPAs background policy ensures the public is presented a complete picture of risks associated with hazardous substances, pollutants, and contaminants at a site. The ROD is deficient with regards to EPA policy because it does not characterize risks to human health or the environment from current conditions in Bear Creek with or without the landfill or consider background risks in risk management decisions. Biological communities and water quality in Bear Creek are already impaired.

8. Text on Page 2-26 indicated that waste acceptance criteria (WAC) would be determined to ensure that even under conditions of failure of the manmade components of the underlying liner system, landfill operation and its state after closure would not harm human health or the environment. Most of these WAC result from existing state and federal environmental regulations that are included in this ROD as ARARs. However, WAC were established based on predictions of future landfill leachates meeting ARARs and did not consider risk of all hazardous substances to ecological receptors. The ARARs did not address ecological risks comprehensively because risks to the food chain from bioaccumulative substances were not considered for chemicals like mercury, PCBs, and uranium. The WAC are another expression of compliance with ARARs versus protection of human health and the environment. ARARs, for example, are not available for depleted uranium, which is known to have environmental impacts. Statements regarding whether the proposed remedy will protect the environment should be caveated or revised to explain that the landfill operation will not violate ARARs. Claims regarding protecting the environment should not be made unless they are backed up by an ecological risk assessment.

9. The WAC were not fully developed at the time of the D1 ROD preventing the EPA from quantifying the long-term risk of the disposal facility. Without this information the protectiveness of the selected remedy cannot be assessed.

10. The ROD is deficient because it does not address the EPA policy and best management practices for green remediation by describing how the selected remedy compares with other remedies in terms of reducing the environmental footprint of waste generation including waste minimization/recycling, handling, treatment, transportation, and disposal. Greenhouse gases emitted in transportation and overall footprint are considered but not all aspects of green remediation on the EPA website were considered https://www.epa.gov/superfund/superfund-green-remediation. In particular, the alternatives did not consider minimizing the environmental footprint by placing the landfill in a currently contaminated area or include adequate evaluation of technologies to minimize waste. EPA's green remediation policy requires that these considerations be factored into risk management decisions.

**SPECIFIC COMMENTS:**

1. *Section 1.6, ROD Certification Checklist, Page 1-7.* Text on Page 1-7 indicated there was no baseline risk assessment conducted for the disposal decision because the action was construction of a new landfill. A CERCLA ROD meeting the threshold criteria of protection of human health and the environment is predicated on having a baseline risk assessment. Revise text of Section 1.5, Statutory Determinations, to state that the selected remedy was determined in the ROD to provide the best balance of tradeoffs among the alternatives with respect to the balancing criteria. Absent a risk assessment, the ROD has not demonstrated that the selected remedy is protective of the environment.

2. *Section 2.5.4, Ecological Resources, Page 2-14.* Text indicated that a strong population of Tennessee dace thrive in Bear Creek but, because none of these fish were observed in the tributary streams at the Central Bear Creek Valley, there was no potential for the selected remedy to affect the fish listed as "in need of management" by the Tennessee Wildlife Resources Agency. The ROD is deficient because it does not adequately explain the location of the Tennessee dace relative to the footprint of the selected remedy nor describe actions that will be taken to minimize impacts to the dace. Replace text stating "none of these fish were observed" with a table showing the number of individuals enumerated since one or two individuals are typically detected in biannual monitoring at Station BCK 9.9 (Figure 1). Revise description of "none" to accurately reflect the numbers present and where they are located.

3. *Section 2.12.2.3 Waste acceptance criteria, Page 2-45.* Ambient water quality criterion for protection of aquatic life of 1,400 ppt represents the criterion maximum concentration (CMC) or the concentration aquatic organisms can be exposed to for brief intervals, typically less than 48-hours without suffering detrimental effects. The 1,400 ppt CMC could apply to a short-term release of mercury to surface water, but it is not protective of chronic exposures. Revise this section to discuss the point of compliance and frequency of monitoring in terms of how the criteria will be applied.

4. *Section 2.12.2.3 Waste acceptance criteria, Page 2-45*. Substantive requirements of TDEC surface water quality standards (WQS) include, in addition to numerical standards, anti-degredation requirements, which means DOE must not degrade waters such that they no longer meet their designated uses. There are no chemical specific EPA National Recommended Water Quality Criteria (NRWQC) for radionuclides in the CWA. However, TDEC has narrative WQS:

> *"The waters shall not be modified through the addition of pollutants or through physical alteration to the extent that the diversity and/or productivity of aquatic biota within the receiving waters are substantially decreased or adversed affected..."*

Although there is no chemical specific Tennessee WQS for radionuclides, the discharge must not violate TDEC narrative WQS. This means that radioactivity or other releases to the environment from the EMDF cannot cause damage to the diversity or productivity of benthic macroinvertebrate communities or fish

communities. Radionuclides have long-half lives, and bioaccumulate in the environment. Monitoring for remedy effectiveness should include benthic macroinvertebrate and fish community surveys and measuments of mercury, PCBs, uranium, and radionuclides in forage fish and benthic macroinvertebrates to assess exposure. To the degree that baseline data are unavailable, data will be necessary to characterize the health of aquatic communities and their contaminant body burdens prior to the landfill construction to provide a point of comparison.

5. *Section 2.12.2.3 Waste acceptance criteria, Mercury management, Page 2-45.* Text on Page 2-45 does not discuss control of mercury methylation although methylmercury is more mobile in the environment and is 90% of the total mercury in fish tissue. A study by Mathews et al. (2013) indicated that surface water concentration would likely need to be less than 51 ppt to achieve the tissue-residue based NRWQC for mercury in fish tissue of 0.5 ppm. Revise the text to discuss the effects of the proposed remedy on mercury methylation and how the proposed remedy will restore water quality in Bear Creek to meet ARARs and meet anti-degradation provisions of TDEC 0400-40-03.

6. *Section 2.12.2.3 Waste acceptance criteria, Mercury management, Page 2-45.* In response to public comments regarding the disposal of mercury in the EMDF, DOE has indicated the Department will meet all regulatory requirements pertaining to mercury treatment and onsite disposal of waste, including Resource Conservation and Recovery Act of 1976 requirements that dictate WAC for mercury. The ROD is deficient because the selected remedy lacks a remedial action objective to reduce the concentrations of mercury in Bear Creek to meet ARARs and restore beneficial uses nor has a waiver of the standards in the TDEQ WQS been included in the selected remedy.

7. *Section 2.12.2.4 Description of EMDF operations, Page 2-46.* Page 2-46 text stated:

> *"Compliance with these discharge limits will assure human health and the environment are fully protected to the requirements of CERCLA."*

The discharge limits pertain to compliance with the $10^{-5}$ risk specified in the Dispute Resolution Decision (footnote 6) and consistent with TDEC 0400-40-03-.03(4)(j) Footnote C, as determined based on site-specific exposure assumptions. These pertain to radionuclides and state that WACs should comply with a risk specified in TDEC rules. However, this provision may not be fully protective under CERCLA because risks of exposure to the environment to chemicals like mercury that bioaccumulate in biota were not considered. Please revise the text by removing the word "fully" and replacing it with a description of current/future risks, receptors, exposure pathways, and hazardous chemicals that are protected by the proposed remedy and the degree of protection provided, i.e., $10^{-5}$ risk, and any assumptions related to exposures that define the degree of protection afforded.

8. *Section 2.12.4 Expected Outcomes of the Selected Remedy, Page 2-49 and Table A.2, Location Specific ARARs*. Please include Clean Water Act (CWA) 404(b)(1) as an ARAR. Text in Section 2.12.4 indicated wetlands mitigation would be implemented as required by ARARs. However, the text did not describe controls to prevent disruption of, impact to, or alteration of wetlands and how effectiveness of such controls would be measured using EPA's wetlands guidance with the goal of "no net loss": https://www.epa.gov/cwa-404/background-about-compensatory-mitigation-requirements-under-cwa-section-404. Revise the text to cite the rules that require wetlands mitigation and refer to Table A.2. If loss is anticipated, outline the process by which on-site or off-site compensatory mitigation will be proposed.

9. *Section 2.13.6, 5-Year Reviews, Page 2-56.* Revise text to state when the five-year reviews would start to clarify whether it is during the time when the landfill is open to receiving wastes or only upon landfill closure. Revise to discuss frequency of monitoring and to whom and in what format the monitoring results will be reported in years between the five-year reviews. Revise the text to describe the entities that will be responsible for reviewing the monitoring data and deciding whether the remedy remains protective of human health and the environment. Explain by what criteria or standards protectiveness will be gauged. Include the point of compliance and list parameters that will be monitored.

10. *Table A.2, Location Specific ARARs.* Table A-2 on Page A-8 considers the presence of floodplains as defined in 10 CFR 1022.4 However, not all executive orders and FEMA regulations pertaining to floodplains were considered. Federally approved projects must comply with Executive Order 11988 (Floodplain Management), as amended by Executive Orders 13690 and 11990 (Protection of Wetlands). The Federal Emergency Management Agency (FEMA) regulations in 44 CFR Part 9 set forth the responsibilities to implement and enforce Executive Order 11988, as amended by Executive Orders 13690 and 11990. Likewise, FEMA regulations found at 44 CFR 60.3(d)(2) and (3) prohibit encroachments that would result in any increase in flood levels during occurrence of base flood discharge. Please revise the ROD to discuss any long-term impacts of altered surface water hydrology and wetlands filling on potential for flooding. Please revise Table 2.1 comparing alternatives to consider potential long-term impacts on hydrology and flood retention.

**REFERENCE:**

Mathews, T.J., Southworth, G., Peterson, M.J., Roy, W.K., Ketelle, R.H., Valentine, C., and S. Gregory. 2013. Decreasing aqueous mercury concentrations to meet the water quality criterion in fish: Examining the water-fish relationship in two point-source contaminated streams. Sci. Tot. Environ. 443: 836-843.

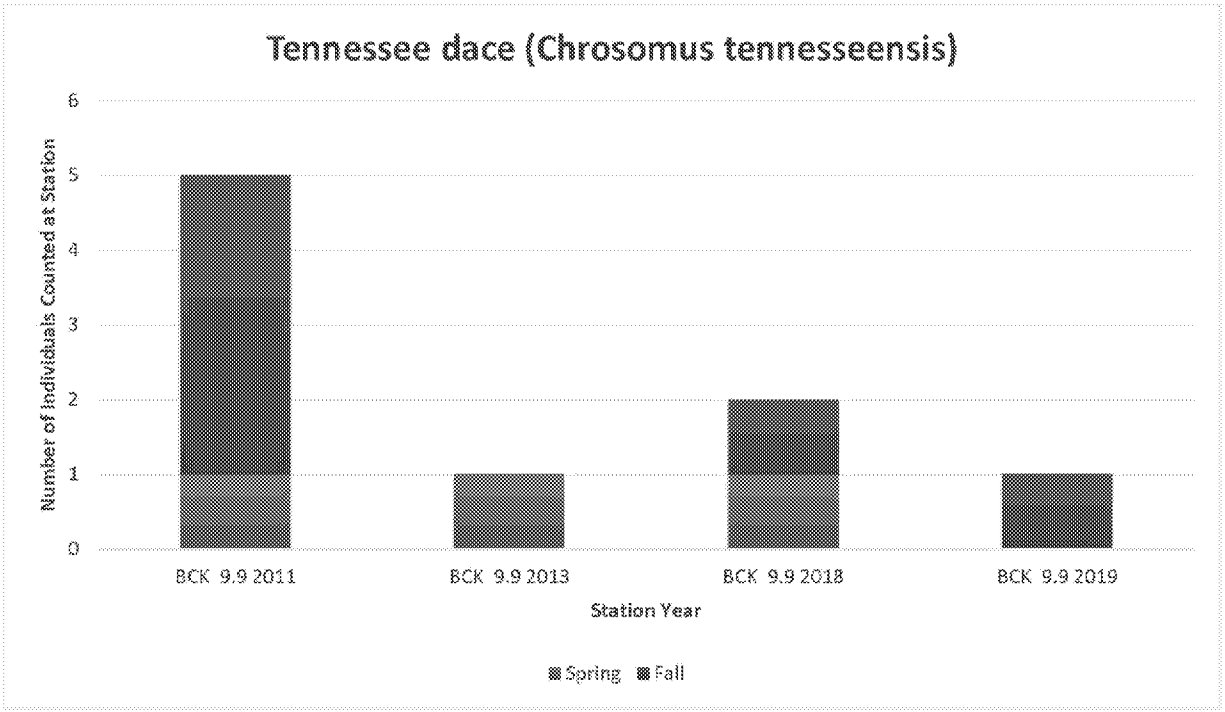


*Figure 1. Numbers of Tennessee dace observed at monitoring station 9.9 in Bear Creek in fall and spring monitoring since 2011.*